



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 2  
DESA/HWSB/HWSS  
2890 Woodbridge Avenue, Edison, NJ 08837

## EXECUTIVE NARRATIVE

**Case No.:** 48579

**Site:** Pierson's Creek

**Number of Samples:** 3 (Surface Water)

**Analysis:** Metals (ICP-MS) and Hg (MA# 2755.2)

**SDG No.:** MBFR60

**Laboratory:** Bonner Analytical Testing Co.

**Sampling dates:** 12/12/2019

**Validation SOP:** HW-3b and 3c (Rev 1)

### **QAPP**

**Contractor:** CDM Smith

**Reference:** DCN:3323-060-03778, February 2019

### **SUMMARY OF DEFINITIONS:**

**Critical:** Results have an unacceptable level of uncertainty and should not be used for making decisions.

Data have been qualified "R" rejected.

**Major:** A level of uncertainty exists that may not meet the data quality objectives for the project. A bias is likely to be present in the results. Data has been qualified "J" estimated. "J+" and "J-" represent likely direction of the bias.

**Minor:** The level of uncertainty is acceptable. No significant bias in the data was observed.

#### **Critical Findings:**

None

#### **Major Findings:**

Sample MBFR60 has analytes that have been qualified J, J+ or J-.

#### **Minor Findings:**

One or more analytes in one or more samples are qualified "J" due to results between MDL and CRQL.

**COMMENT:** **Metals and Hg:** One or more non-detected and detected analytes exceeded the project action levels (PALs) for one or more samples. Concentrations of **Arsenic and Iron** exceeded the PALs more than 100 folds.

**Reviewer Name(s):** Jianwei Huang

**Approver's Signature:**

**Date:** 02-14-2020

**Name:** Narendra Kumar

**Affiliation:** USEPA/R2/HWSB/HWSS



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Data Qualifier Definitions (National Functional Guidelines)			
Qualifier Symbol	Explanation		
	INORGANICS	ORGANICS	CHLORINATED DIOXIN/FURAN
U	The analyte was analyzed for, but was not detected above the level of the reported quantitation limit.	The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted Contract Required Quantitation Limit (CRQL) for sample and method	The analyte was analyzed for but not detected. The value preceding the "U" may represent the adjusted Contract Required Quantitation Limit (see DLM02.X, Exhibit D, Section 1.2 and Table 2), or the sample specific estimated detection limit (EDL, see Method 8290A, Section 11.9.5).
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.	The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to the quality of the data generated because certain quality control criteria were not met, or the concentration of the analyte was below the CRQL).	The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to an issue with the quality of the data generated because certain QC criteria were not met, or the concentration of the analyte was below the adjusted CRQL).
J+	The result is an estimated quantity, but the result may be biased high.	The result is an estimated quantity, but the result may be biased high.	
J-	The result is an estimated quantity, but the result may be biased low.	The result is an estimated quantity, but the result may be biased low.	
UJ	The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.	The analyte was not detected at a level greater than or equal to the adjusted CRQL. However, the reported adjusted CRQL is approximate and may be inaccurate or imprecise.	The analyte was not detected (see definition of "U" flag, above). The reported value should be considered approximate.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.	The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.	The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.
N		The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification".	
NJ		The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.	
C		This qualifier applies to pesticide and Aroclor results when the identification has been confirmed by Gas Chromatograph/Mass Spectrometer (GC/MS).	
X		This qualifier applies to pesticide and Aroclor results when GC/MS analysis was attempted but was unsuccessful.	



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## DATA ASSESSMENT

### ANALYSIS: METALS ICP-MS

The current SOP HW-3b (Rev 1) September 2016, USEPA Region II for the evaluation of ICP-MS metals generated through Statement of Work ISOM02.2, and any future editorial revisions of ISOM02.2 has been applied. Data have been reviewed according to TDF specifications, the National Functional Guidelines Report and the CCS Semi- Automated Screening Results Report.

#### 1. HOLDING TIME AND PRESERVATION

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time or pH (aqueous samples are not within the acceptable range, the data may not be valid. Those analytes detected in the samples whose holding time (180 days) or pH (<2) have not been met, will be qualified as estimated, "J"; the non-detects will be flagged as unusable, "R". Qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.

#### 2. CALIBRATION

Method requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable quantitative data for the metals on the Inorganic Target Analyte List (TAL). Initial Calibration Verification (ICV) demonstrates that the instrument is capable of acceptable performance at the beginning of the analytical run. Continuing Calibration Verification (CCV) demonstrates that the initial calibration is still valid by checking the performance of the instrument on a continuing basis.

##### A) INITIAL CALIBRATION

A blank and at least five calibration standards shall be used to establish each analytical curve. At least one of these standards shall be at or below the CRQL. The calibration curve shall be fitted using linear regression or weighted linear regression. The curve may be forced through zero. The curve must have a correlation coefficient  $\geq 0.995$ . The percent differences calculated for all of the non-zero standards must be within  $\pm 30\%$  of the true value of the standard. The y-intercept of the curve must be less than the CRQL. Qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.

##### B) INITIAL AND CONTINUING CALIBRATION VERIFICATION

Immediately after each system has been calibrated, the accuracy of the initial calibration must be verified and documented for each target analyte by the analysis of an ICV solution(s). The CCV standard shall be analyzed at a frequency of every two hours during an analytical run. The CCV standard shall also be analyzed at the beginning of the run, and again after the last analytical sample. The percent recovery acceptable limits for ICV/CCV are 90 – 110%. Qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.



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### 3. BLANK CONTAMINATION

Quality assurance (QA) blanks, i.e., method, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during sample preparation or field activity. Calibration blanks (ICB and CCB) are used to ensure a stable instrument baseline before and during the analysis of analytical samples. The preparation blank is used to assess the level of contamination introduced to the analytical samples throughout the sample preparation process. Field and rinse blanks measure cross-contamination of samples during field operations. Qualifications were applied to the samples and analytes as shown below.

The following samples have analyte results greater than or equal to MDLs and less than or equal to CRQLs. The associated ICB analyte results are greater than or equal to MDLs and less than or equal to CRQLs. Detects are qualified as U. Sample results are reported at CRQLs.

Antimony MBFFR60, MBFR61

### 4. INTERFERENCE CHECK SAMPLE

The Interference Check Sample (ICS) verifies the analytical instrument's ability to overcome interferences typical of those found in samples. The laboratory should have analyzed and reported ICS results for all elements being reported from the analytical run and for all interferents (target and non-target) for these reported elements. The ICS consists of two solutions: Solution A and Solution AB. Solution A consists of the interferents, and Solution AB consists of the analytes mixed with the interferents. Results for the analysis of ICS Solution must fall within the control limits of  $\pm 20\%$  or  $\pm 2X$  CRQL (whichever is greater) of the true value for the analytes and interferents included in the solution. If results that are  $\geq$  MDL are observed for analytes that are not present in the ICS solution, the possibility of false positives exists. If negative results are observed for analytes that are not present in the ICS solution, and their absolute value is  $\geq$  MDL, the possibility of false negatives in the samples exists. In general, ICP sample data can be accepted if the concentrations of Al, Ca, Fe, and Mg in the sample are found to be less than or equal to their respective concentrations in the ICS. Qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.

### 5. SPIKE SAMPLE ANALYSIS

The spiked sample analysis is designed to provide information about the effect of each sample matrix on the sample preparation procedures and the measurement methodology. The spike Percent Recovery (%R) shall be within the established acceptance limits of 75 – 125%. However, spike recovery limits do not apply when the sample concentration is  $\geq 4x$  the spike added. For a matrix spike analysis that does not meet the technical criteria, the action was applied to only the field sample used to prepare the matrix spike sample.

No problems were found for this criterion.

### 6. DUPLICATE SAMPLE ANALYSIS

The objective of duplicate sample analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. A control limit of 20% for the Relative Percent Difference (RPD) shall be used for original and duplicate sample values  $\geq$  five times (5x) the Contract Required Quantitation Limit (CRQL). A control limit of the CRQL shall be used if either the sample or



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**duplicate value is < 5x the CRQL. For a duplicate sample analysis that does not meet the technical criteria, the action was applied to only the field sample used to prepare the duplicate sample.**

The following aqueous sample is associated with a Duplicate sample that has analyte results greater than 5xCRQL in both Duplicate and original samples and RPD is greater than 20% and less than 100%. Detects with results greater than or equal to CRQLs are qualified as estimated J.

**Arsenic and Sodium MBFR60**

## **7. FIELD DUPLICATE**

**Field duplicates may be taken and analyzed as an indication of overall precision. These analyses measure both field and laboratory precision. A control limit of 20% for the Relative Percent Difference (RPD) shall be used for original and duplicate sample values  $\geq$  five times (5x) the Contract Required Quantitation Limit (CRQL). A control limit of the CRQL shall be used if either the sample or duplicate value is < 5x the CRQL. For field duplicates analysis that does not meet the technical criteria, the action was applied to only the field sample and it's duplicate.**

No field duplicate sample was identified in this SDG.

## **8. LABORATORY CONTROL SAMPLE**

**The Laboratory Control Sample (LCS) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Aqueous/water, soil/sediment, wipe, and filter LCSs shall be analyzed for each analyte utilizing the same sample preparations, analytical methods, and Quality Assurance/Quality Control (QA/QC) procedures as employed for the samples. All LCS Percent Recoveries (%R) must fall within the control limits of 70-130%, except for Sb and Ag which must fall within the control limits of 50-150%. Qualifications were applied to the samples and analytes as shown below.**

No problems were found for this criterion.

## **9. ICP SERIAL DILUTION**

**The serial dilution of samples quantitated by Inductively Coupled Plasma determines whether or not significant physical or chemical interferences exist due to sample matrix. If the analyte concentration is sufficiently high [concentration in the original sample is  $>$  50 times (50x) the Method Detection Limit (MDL)], the Percent Difference (%D) between the original determination and the serial dilution analysis (a five-fold dilution) after correction for dilution shall be less than 10. For a serial dilution analysis that does not meet the technical criteria, the action was applied to only the field sample used to prepare the serial dilution sample.**

The following aqueous sample is associated with Serial Dilution (SD) sample that has analyte %D greater than 10% but less than 100%. The original sample analyte concentrations are greater than 50xMDLs. Detects are qualified as estimated J. Non-detects are not qualified.

**Barium, Calcium, Cobalt, Iron, Magnesium, Nickel, Potassium and Zinc MBFR60**

## **10. ICP-MS TUNE ANALYSIS**

**The Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) tune serves as an initial demonstration of instrument stability and precision. Prior to calibration, the laboratory shall**



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analyze or scan the ICP-MS tuning solution at least five times (5x) consecutively. The tuning solution contains 100 µg/L of Be, Mg, Co, In, and Pb. The solution shall contain all required isotopes of the above elements. The laboratory shall make any adjustments necessary to bring peak width within the instrument manufacturer's specifications and adjust mass resolution to within 0.1 u over the range of 6-210 u. The Percent Relative Standard Deviation (%RSD) of the absolute signals for all analytes in the tuning solution must be < 5%. Qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.

#### 11. ICP-MS INTERNAL STANDARDS

The analysis of Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) internal standards determines the existence and magnitude of instrument drift and physical interferences. The criteria for evaluation of internal standard results apply to all analytical and Quality Control (QC) samples analyzed during the run, beginning with the calibration.

All samples analyzed during a run, with the exception of the ICP-MS tune, shall contain internal standards. A minimum of five internal standards shall be added to each sample. The laboratory shall monitor the same internal standards throughout the entire analytical run and shall assign each analyte to at least one internal standard. The Percent Relative Intensity (%RI) in the sample shall fall within 60-125% of the response in the calibration blank. If the %RI of the response in the sample falls outside of these limits, the laboratory shall reanalyze the original sample at a two-fold dilution with internal standard added. Qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.

#### 12. PERCENT SOLIDS

The laboratory is required to perform the percent solids determination prior to sample preparation and analysis. All results of a sample with percent solids less than 50% are qualified estimated, "J". Qualifications were applied to the samples and analytes as shown below.

Not applicable.

### ANALYSIS: MERCURY (MA# 2755.2)

The current SOP HW-3c (Rev 1) September 2016, USEPA Region II for the evaluation of Mercury generated through Statement of Work ISOM02.2, and any future editorial revisions of ISOM02.2 has been applied. Data have been reviewed according to TDF specifications, the National Functional Guidelines Report and the CCS Semi- Automated Screening Results Report.

#### 1. HOLDING TIME AND PRESERVATION

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time, pH (aqueous samples), or cooler temperature are not within the acceptable range, the data may not be valid. Those analytes detected in the samples whose holding time (28 days) and pH (<2) have not been met, will be qualified as estimated, "J"; the non-detects (sample quantitation limits) will be flagged as unusable, "R". Qualifications were applied to the samples and analytes as shown below.



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No problems were found for this criterion.

## 2. CALIBRATION

Method requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable quantitative data for mercury. Initial Calibration Verification (ICV) demonstrates that the instrument is capable of acceptable performance at the beginning of the analytical run. Continuing Calibration Verification (CCV) demonstrates that the initial calibration is still valid by checking the performance of the instrument on a continuing basis.

### A) INITIAL CALIBRATION

A blank and at least five calibration standards shall be employed to establish the analytical curve. At least one of the calibration standards shall be at or below the Contract Required Quantitation Limit (CRQL). The calibration curve shall be fitted using linear regression or weighted linear regression. The curve may be forced through zero. The calibration curves for mercury shall possess a correlation coefficient of  $\geq 0.995$  to ensure the linearity over the calibrated range. The percent differences calculated for all of the non-zero standards must fall within  $\pm 30\%$  of the true value of the standard. The y-intercept of the curve must be less than the CRQL. All sample results shall be reported from an analysis within the calibrated range. Qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.

### B) INITIAL AND CONTINUING CALIBRATION VERIFICATION

Immediately after each system has been calibrated, the accuracy of the initial calibration must be verified and documented for mercury by the analysis of an ICV solution(s). The CCV standard shall be analyzed at a frequency of every hour during an analytical run. The CCV standard shall also be analyzed at the beginning of the run, and again after the last analytical sample. The percent recovery acceptable limits for ICV/CCV are 85 – 115%. Qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.

## 3. BLANK CONTAMINATION

Quality assurance (QA) blanks, i.e., method, field, or rinse blanks are prepared to identify any contamination, which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Field and rinse blanks measure cross-contamination of samples during field operations. Qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.

## 4. SPIKE SAMPLE ANALYSIS

The spiked sample analysis is designed to provide information about the effect of each sample matrix on the sample preparation procedures and the measurement methodology. The spike Percent Recovery (%R) shall be within the established acceptance limits of 75 – 125%. However,



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spike recovery limits do not apply when the sample concentration is  $\geq 4x$  the spike added. For a matrix spike analysis that does not meet the technical criteria, the action was applied to only the field sample used to prepare the matrix spike sample.

No problems were found for this criterion.

## 5. DUPLICATE SAMPLE ANALYSIS

The objective of duplicate sample analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. A control limit of 20% for the Relative Percent Difference (RPD) shall be used for original and duplicate sample values  $\geq$  five times (5x) the Contract Required Quantitation Limit (CRQL). A control limit of the CRQL shall be used if either the sample or duplicate value is  $< 5x$  the CRQL. For a duplicate sample analysis that does not meet the technical criteria, the action was applied to only the field sample used to prepare the duplicate sample.

No problems were found for this criterion.

## 6. FIELD DUPLICATE

Field duplicates may be taken and analyzed as an indication of overall precision. These analyses measure both field and laboratory precision. A control limit of 20% for the Relative Percent Difference (RPD) shall be used for original and duplicate sample values  $\geq$  five times (5x) the Contract Required Quantitation Limit (CRQL). A control limit of the CRQL shall be used if either the sample or duplicate value is  $< 5x$  the CRQL. For field duplicates analysis that does not meet the technical criteria, the action was applied to only the field sample and it's duplicate.

No field duplicate sample was identified in this SDG.

## 7. PERCENT SOLIDS

The laboratory is required to perform the percent solids determination prior to sample preparation and analysis. Qualifications were applied to the samples and analytes as shown below.

Not applicable.

# Sample Summary Report

Project Name: PIERSON'S CREEK Project

GroupID: 48579/EPW14029/MBFR60

Lab Name: Bonner Analytical Testing Co.

Sample Number: LCS01	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture:		% Solids:	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Spike	31.5		ug/L	31.5		1	YES	S3VEM
Antimony	Spike	3.7		ug/L	3.7		1	YES	S3VEM
Arsenic	Spike	2.3		ug/L	2.3		1	YES	S3VEM
Barium	Spike	19.1		ug/L	19.1		1	YES	S3VEM
Beryllium	Spike	1.9		ug/L	1.9		1	YES	S3VEM
Cadmium	Spike	2.0		ug/L	2.0		1	YES	S3VEM
Calcium	Spike	951		ug/L	951		1	YES	S3VEM
Chromium	Spike	4.2		ug/L	4.2		1	YES	S3VEM
Cobalt	Spike	1.9		ug/L	1.9		1	YES	S3VEM
Copper	Spike	4.0		ug/L	4.0		1	YES	S3VEM
Iron	Spike	423		ug/L	423		1	YES	S3VEM
Lead	Spike	1.9		ug/L	1.9		1	YES	S3VEM
Magnesium	Spike	886		ug/L	886		1	YES	S3VEM
Manganese	Spike	1.9		ug/L	1.9		1	YES	S3VEM
Nickel	Spike	2.1		ug/L	2.1		1	YES	S3VEM
Potassium	Spike	797		ug/L	797		1	YES	S3VEM
Selenium	Spike	10.7		ug/L	10.7		1	YES	S3VEM
Silver	Spike	1.8		ug/L	1.8		1	YES	S3VEM
Sodium	Spike	933		ug/L	933		1	YES	S3VEM
Thallium	Spike	1.9		ug/L	1.9		1	YES	S3VEM
Vanadium	Spike	11.2		ug/L	11.2		1	YES	S3VEM
Zinc	Spike	3.9		ug/L	3.9		1	YES	S3VEM

# Sample Summary Report

Project Name: PIERSON'S CREEK Project

GroupID: 48579/EPW14029/MBFR60

Lab Name: Bonner Analytical Testing Co.

Sample Number: MBFR60

Method: Mercury by Cold Vapor

Matrix: Water

MA Number: 2755.2

Sample Location: D1

pH: 1.

Sample Date: 12/12/2019

Sample Time: 09:45:00

% Moisture:

% Solids:

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.050	U	ug/L	0.050	U	1	YES	S3VEM

# Sample Summary Report

Project Name: PIERSON'S CREEK Project

GroupID: 48579/EPW14029/MBFR60

Lab Name: Bonner Analytical Testing Co.

Sample Number: MBFR60	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location: D1	pH: 1.	Sample Date: 12/12/2019	Sample Time: 09:45:00
% Moisture:		% Solids:	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	20.0	U	ug/L	20.0	U	1	YES	S3VEM
Antimony	Target	2.0	U	ug/L	1.2	J	1	YES	S3VEM
Arsenic	Target	3740	J	ug/L	3740	D*	10	YES	S3VEM
Barium	Target	301	J	ug/L	301	*	1	YES	S3VEM
Beryllium	Target	1.0	U	ug/L	1.0	U	1	YES	S3VEM
Cadmium	Target	0.15	J	ug/L	0.15	J	1	YES	S3VEM
Calcium	Target	104000	J	ug/L	104000	*	1	YES	S3VEM
Chromium	Target	1.1	J	ug/L	1.1	J	1	YES	S3VEM
Cobalt	Target	21.4	J	ug/L	21.4	*	1	YES	S3VEM
Copper	Target	0.69	J	ug/L	0.69	J	1	YES	S3VEM
Iron	Target	14300	J	ug/L	14300	*	1	YES	S3VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	YES	S3VEM
Magnesium	Target	16600	J	ug/L	16600	*	1	YES	S3VEM
Manganese	Target	738		ug/L	738		1	YES	S3VEM
Nickel	Target	17.9	J	ug/L	17.9	*	1	YES	S3VEM
Potassium	Target	11000	J	ug/L	11000	*	1	YES	S3VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	YES	S3VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	YES	S3VEM
Sodium	Target	227000	J	ug/L	227000	D*	10	YES	S3VEM
Thallium	Target	1.0	U	ug/L	1.0	U	1	YES	S3VEM
Vanadium	Target	5.0	U	ug/L	5.0	U	1	YES	S3VEM
Zinc	Target	184	J	ug/L	184	*	1	YES	S3VEM

# Sample Summary Report

Project Name: PIERSON'S CREEK Project

GroupID: 48579/EPW14029/MBFR60

Lab Name: Bonner Analytical Testing Co.

Sample Number: MBFR60D

Method: Mercury by Cold Vapor

Matrix: Water

MA Number: 2755.2

Sample Location:

pH: 1.

Sample Date: 12/12/2019

Sample Time: 09:45:00

% Moisture:

% Solids:

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.050	U	ug/L	0.050	U	1	YES	S3VEM

# Sample Summary Report

Project Name: PIERSON'S CREEK Project

GroupID: 48579/EPW14029/MBFR60

Lab Name: Bonner Analytical Testing Co.

Sample Number: MBFR60D	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location:	pH: 1.	Sample Date: 12/12/2019	Sample Time: 09:45:00
% Moisture:		% Solids:	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	20.0	U	ug/L	20.0	U	1	YES	S3VEM
Antimony	Target	1.4	J	ug/L	1.4	J	1	YES	S3VEM
Arsenic	Target	4910		ug/L	4910	D*	10	YES	S3VEM
Barium	Target	349		ug/L	349		1	YES	S3VEM
Beryllium	Target	1.0	U	ug/L	1.0	U	1	YES	S3VEM
Cadmium	Target	0.24	J	ug/L	0.24	J	1	YES	S3VEM
Calcium	Target	120000		ug/L	120000		1	YES	S3VEM
Chromium	Target	1.3	J	ug/L	1.3	J	1	YES	S3VEM
Cobalt	Target	25.1		ug/L	25.1		1	YES	S3VEM
Copper	Target	0.86	J	ug/L	0.86	J	1	YES	S3VEM
Iron	Target	17100		ug/L	17100		1	YES	S3VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	YES	S3VEM
Magnesium	Target	19200		ug/L	19200		1	YES	S3VEM
Manganese	Target	881		ug/L	881		1	YES	S3VEM
Nickel	Target	21.1		ug/L	21.1		1	YES	S3VEM
Potassium	Target	12400		ug/L	12400		1	YES	S3VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	YES	S3VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	YES	S3VEM
Sodium	Target	290000		ug/L	290000	D*	10	YES	S3VEM
Thallium	Target	0.13	J	ug/L	0.13	J	1	YES	S3VEM
Vanadium	Target	0.55	J	ug/L	0.55	J	1	YES	S3VEM
Zinc	Target	217		ug/L	217		1	YES	S3VEM

# Sample Summary Report

Project Name: PIERSON'S CREEK Project

GroupID: 48579/EPW14029/MBFR60

Lab Name: Bonner Analytical Testing Co.

Sample Number: MBFR60L	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location:	pH: 1.	Sample Date:	Sample Time:
% Moisture:		% Solids:	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	100	U	ug/L	100	U	5	YES	S3VEM
Antimony	Target	10.0	U	ug/L	10.0	U	5	YES	S3VEM
Arsenic	Target	3760		ug/L	3760	D	50	YES	S3VEM
Barium	Target	254		ug/L	254	*	5	YES	S3VEM
Beryllium	Target	5.0	U	ug/L	5.0	U	5	YES	S3VEM
Cadmium	Target	5.0	U	ug/L	5.0	U	5	YES	S3VEM
Calcium	Target	84000		ug/L	84000	*	5	YES	S3VEM
Chromium	Target	1.4	J	ug/L	1.4	J	5	YES	S3VEM
Cobalt	Target	18.2		ug/L	18.2	*	5	YES	S3VEM
Copper	Target	10.0	U	ug/L	10.0	U	5	YES	S3VEM
Iron	Target	12800		ug/L	12800	*	5	YES	S3VEM
Lead	Target	5.0	U	ug/L	5.0	U	5	YES	S3VEM
Magnesium	Target	13200		ug/L	13200	*	5	YES	S3VEM
Manganese	Target	672		ug/L	672		5	YES	S3VEM
Nickel	Target	16.0		ug/L	16.0	*	5	YES	S3VEM
Potassium	Target	8880		ug/L	8880	*	5	YES	S3VEM
Selenium	Target	25.0	U	ug/L	25.0	U	5	YES	S3VEM
Silver	Target	5.0	U	ug/L	5.0	U	5	YES	S3VEM
Sodium	Target	218000		ug/L	218000	D	50	YES	S3VEM
Thallium	Target	5.0	U	ug/L	5.0	U	5	YES	S3VEM
Vanadium	Target	25.0	U	ug/L	25.0	U	5	YES	S3VEM
Zinc	Target	158		ug/L	158	*	5	YES	S3VEM

# Sample Summary Report

Project Name: PIERSON'S CREEK Project

GroupID: 48579/EPW14029/MBFR60

Lab Name: Bonner Analytical Testing Co.

Sample Number: MBFR60S

Method: Mercury by Cold Vapor

Matrix: Water

MA Number: 2755.2

Sample Location:

pH: 1.

Sample Date: 12/12/2019

Sample Time: 09:45:00

% Moisture:

% Solids:

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Spike	0.81		ug/L	0.81		1	YES	S3VEM

# Sample Summary Report

Project Name: PIERSON'S CREEK Project

GroupID: 48579/EPW14029/MBFR60

Lab Name: Bonner Analytical Testing Co.

Sample Number: MBFR60S	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location:	pH: 1.	Sample Date: 12/12/2019	Sample Time: 09:45:00
% Moisture:		% Solids:	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Antimony	Spike	108		ug/L	108		1	YES	S3VEM
Arsenic	Spike	5160		ug/L	5160	D	10	YES	S3VEM
Barium	Spike	2450		ug/L	2450		1	YES	S3VEM
Beryllium	Spike	48.2		ug/L	48.2		1	YES	S3VEM
Cadmium	Spike	50.0		ug/L	50.0		1	YES	S3VEM
Chromium	Spike	201		ug/L	201		1	YES	S3VEM
Cobalt	Spike	499		ug/L	499		1	YES	S3VEM
Copper	Spike	237		ug/L	237		1	YES	S3VEM
Lead	Spike	20.2		ug/L	20.2		1	YES	S3VEM
Manganese	Spike	1270		ug/L	1270		1	YES	S3VEM
Nickel	Spike	492		ug/L	492		1	YES	S3VEM
Selenium	Spike	93.3		ug/L	93.3		1	YES	S3VEM
Silver	Spike	49.1		ug/L	49.1		1	YES	S3VEM
Thallium	Spike	48.3		ug/L	48.3		1	YES	S3VEM
Vanadium	Spike	560		ug/L	560		1	YES	S3VEM
Zinc	Spike	650		ug/L	650		1	YES	S3VEM

# Sample Summary Report

Project Name: PIERSON'S CREEK Project

GroupID: 48579/EPW14029/MBFR60

Lab Name: Bonner Analytical Testing Co.

Sample Number: MBFR61

Method: Mercury by Cold Vapor

Matrix: Water

MA Number: 2755.2

Sample Location: D3

pH: 1.

Sample Date: 12/12/2019

Sample Time: 11:25:00

% Moisture:

% Solids:

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.024	J	ug/L	0.024	J	1	YES	S3VEM

# Sample Summary Report

Project Name: PIERSON'S CREEK Project

GroupID: 48579/EPW14029/MBFR60

Lab Name: Bonner Analytical Testing Co.

Sample Number: MBFR61	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location: D3	pH: 1.	Sample Date: 12/12/2019	Sample Time: 11:25:00
% Moisture:		% Solids:	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	20.0	U	ug/L	20.0	U	1	YES	S3VEM
Antimony	Target	2.0	U	ug/L	0.62	J	1	YES	S3VEM
Arsenic	Target	550		ug/L	550	*	1	YES	S3VEM
Barium	Target	55.2		ug/L	55.2	*	1	YES	S3VEM
Beryllium	Target	1.0	U	ug/L	1.0	U	1	YES	S3VEM
Cadmium	Target	1.0	U	ug/L	1.0	U	1	YES	S3VEM
Calcium	Target	79200		ug/L	79200	*	1	YES	S3VEM
Chromium	Target	0.78	J	ug/L	0.78	J	1	YES	S3VEM
Cobalt	Target	0.73	J	ug/L	0.73	J*	1	YES	S3VEM
Copper	Target	3.9		ug/L	3.9		1	YES	S3VEM
Iron	Target	14800		ug/L	14800	*	1	YES	S3VEM
Lead	Target	0.93	J	ug/L	0.93	J	1	YES	S3VEM
Magnesium	Target	14000		ug/L	14000	*	1	YES	S3VEM
Manganese	Target	249		ug/L	249		1	YES	S3VEM
Nickel	Target	4.7		ug/L	4.7	*	1	YES	S3VEM
Potassium	Target	13700		ug/L	13700	*	1	YES	S3VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	YES	S3VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	YES	S3VEM
Sodium	Target	99300		ug/L	99300	*	1	YES	S3VEM
Thallium	Target	1.0	U	ug/L	1.0	U	1	YES	S3VEM
Vanadium	Target	0.71	J	ug/L	0.71	J	1	YES	S3VEM
Zinc	Target	45.9		ug/L	45.9	*	1	YES	S3VEM

# Sample Summary Report

Project Name: PIERSON'S CREEK Project

GroupID: 48579/EPW14029/MBFR60

Lab Name: Bonner Analytical Testing Co.

Sample Number: MBFR82

Method: Mercury by Cold Vapor

Matrix: Water

MA Number: 2755.2

Sample Location: Globe Metals Well

pH: 1.

Sample Date: 12/12/2019

Sample Time: 14:00:00

% Moisture:

% Solids:

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.050	U	ug/L	0.050	U	1	YES	S3VEM

# Sample Summary Report

Project Name: PIERSON'S CREEK Project

GroupID: 48579/EPW14029/MBFR60

Lab Name: Bonner Analytical Testing Co.

Sample Number: MBFR82	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location: Globe Metals Well	pH: 1.	Sample Date: 12/12/2019	Sample Time: 14:00:00
% Moisture:		% Solids:	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	20.0	U	ug/L	20.0	U	1	YES	S3VEM
Antimony	Target	2.0	U	ug/L	2.0	U	1	YES	S3VEM
Arsenic	Target	5070		ug/L	5070	D*	10	YES	S3VEM
Barium	Target	43.4		ug/L	43.4	*	1	YES	S3VEM
Beryllium	Target	1.0	U	ug/L	1.0	U	1	YES	S3VEM
Cadmium	Target	1.0	U	ug/L	1.0	U	1	YES	S3VEM
Calcium	Target	107000		ug/L	107000	*	1	YES	S3VEM
Chromium	Target	1.0	J	ug/L	1.0	J	1	YES	S3VEM
Cobalt	Target	0.51	J	ug/L	0.51	J*	1	YES	S3VEM
Copper	Target	0.48	J	ug/L	0.48	J	1	YES	S3VEM
Iron	Target	42600		ug/L	42600	*	1	YES	S3VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	YES	S3VEM
Magnesium	Target	18400		ug/L	18400	*	1	YES	S3VEM
Manganese	Target	611		ug/L	611		1	YES	S3VEM
Nickel	Target	3.5		ug/L	3.5	*	1	YES	S3VEM
Potassium	Target	17200		ug/L	17200	*	1	YES	S3VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	YES	S3VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	YES	S3VEM
Sodium	Target	107000		ug/L	107000	*	1	YES	S3VEM
Thallium	Target	1.0	U	ug/L	1.0	U	1	YES	S3VEM
Vanadium	Target	0.59	J	ug/L	0.59	J	1	YES	S3VEM
Zinc	Target	16.4		ug/L	16.4	*	1	YES	S3VEM

# Sample Summary Report

Project Name: PIERSON'S CREEK Project

GroupID: 48579/EPW14029/MBFR60

Lab Name: Bonner Analytical Testing Co.

Sample Number: PBW01	Method: Mercury by Cold Vapor	Matrix: Water	MA Number: 2755.2
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture:		% Solids:	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Mercury	Target	0.050	U	ug/L	0.050	U	1	YES	S3VEM

# Sample Summary Report

Project Name: PIERSON'S CREEK Project

GroupID: 48579/EPW14029/MBFR60

Lab Name: Bonner Analytical Testing Co.

Sample Number: PBW01	Method: Metals by ICP-MS	Matrix: Water	MA Number:
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture:		% Solids:	

Analyte Name	Analyte Type	Validation Result	Validation Flag	Units	Lab Result	Lab Flag	Dilution Factor	Reportable	Validation Level
Aluminum	Target	20.0	U	ug/L	20.0	U	1	YES	S3VEM
Antimony	Target	2.0	U	ug/L	2.0	U	1	YES	S3VEM
Arsenic	Target	1.0	U	ug/L	1.0	U	1	YES	S3VEM
Barium	Target	-0.22	J	ug/L	-0.22	J	1	YES	S3VEM
Beryllium	Target	1.0	U	ug/L	1.0	U	1	YES	S3VEM
Cadmium	Target	1.0	U	ug/L	1.0	U	1	YES	S3VEM
Calcium	Target	67.9	J	ug/L	67.9	J	1	YES	S3VEM
Chromium	Target	2.0	U	ug/L	2.0	U	1	YES	S3VEM
Cobalt	Target	-0.070	J	ug/L	-0.070	J	1	YES	S3VEM
Copper	Target	2.0	U	ug/L	2.0	U	1	YES	S3VEM
Iron	Target	200	U	ug/L	200	U	1	YES	S3VEM
Lead	Target	1.0	U	ug/L	1.0	U	1	YES	S3VEM
Magnesium	Target	500	U	ug/L	500	U	1	YES	S3VEM
Manganese	Target	0.35	J	ug/L	0.35	J	1	YES	S3VEM
Nickel	Target	1.0	U	ug/L	1.0	U	1	YES	S3VEM
Potassium	Target	-41	J	ug/L	-41	J	1	YES	S3VEM
Selenium	Target	5.0	U	ug/L	5.0	U	1	YES	S3VEM
Silver	Target	1.0	U	ug/L	1.0	U	1	YES	S3VEM
Sodium	Target	-18	J	ug/L	-18	J	1	YES	S3VEM
Thallium	Target	1.0	U	ug/L	1.0	U	1	YES	S3VEM
Vanadium	Target	5.0	U	ug/L	5.0	U	1	YES	S3VEM
Zinc	Target	2.0	U	ug/L	2.0	U	1	YES	S3VEM

# Sample Summary Report

Project Name: PIERSON'S CREEK Project

GroupID: 48579/EPW14029/MBFR60

Lab Name: Bonner Analytical Testing Co.